

WHAT IS CLAIMED IS:

1. A method for generating a preamble sequence in an orthogonal frequency division multiplexing (OFDM) communication system having m subcarriers in a frequency domain, comprising the steps of:
5 grouping the m subcarriers by n subcarriers, where n is less than m, so as to generate p subchannels; and
assigning null data to subcarriers except the n subcarriers assigned to the subchannels, assigning data of a given sequence to at least one subchannel
10 selected from the p subchannels, assigning null data to subchannels not selected from the p subchannels, and thereafter performing inverse fast Fourier transform (IFFT) for transforming the data into time-domain data.

2. The method of claim 1, wherein if m=256, p=4, the number of
15 the selected subchannels is 1, the selected one subchannel is a subchannel #1 which is a first subchannel among the 4 subchannels, then the given sequence is P111subch(-100:100) given by

P111subch(-100:100)={

	-1 0 +1 0 +1 0 -1 0 -1 0 -1 0	[-100:-89] subch#1
20	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	[- 88:-76] subch#2
	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	[- 75:-64] subch#3
	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	[- 63:-51] subch#4
	+1 0 +1 0 +1 0 -1 0 +1 0 -1 0	[- 50:-39] subch#1
	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	[- 38:-26] subch#2
25	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	[- 25:-14] subch#3
	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	[- 13:- 1] subch#4
	0	[DC]

```

0 +1 0 -1 0 +1 0 +1 0 -1 0 -1 0           [  1: 13] subch#1
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0          [ 14: 25] subch#2
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0         [ 26: 38] subch#3
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0         [ 39: 50] subch#4
5      0 -1 0 -1 0 -1 0 -1 0 +1 0 -1 0           [ 51: 63] subch#1
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0          [ 64: 75] subch#2
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0         [ 76: 88] subch#3
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0         [ 89:100] subch#4

}*sqrt(2)*sqrt(2)

```

10 where $(n_x:n_y)$ represents subcarriers of n_x^{th} to n_y^{th} subcarriers.

3. The method of claim 1, wherein if $m=256$, $p=4$, the number of the selected subchannels is 1, the selected one subchannel is a subchannel #1 which is a first subchannel among the 4 subchannels, then the given sequence is
15 P211subch(-100:100) given by

```

P211subch(-100:100)={

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0          [-100:-89] subch#3
-1 0 +1 0 +1 0 -1 0 -1 0 -1 0 -1 0 -1          [- 88:-76] subch#1
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0          [- 75:-64] subch#4
20      0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0          [- 63:-51] subch#2
+1 0 -1 0 -1 0 +1 0 -1 0 -1 0 -1 0             [- 50:-39] subch#1
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0          [- 38:-26] subch#3
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0          [- 25:-14] subch#2
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0          [- 13:- 1] subch#4

25      0                                         [DC]

```

```

0 +1 0 -1 0 +1 0 -1 0 +1 0 -1 0      [ 1: 13] subch#1
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0          [ 14: 25] subch#3
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0          [ 26: 38] subch#2
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0          [ 39: 50] subch#4
5   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0      [ 51: 63] subch#3
-1 0 -1 0 +1 0 +1 0 +1 0 +1 0      [ 64: 75] subch#1
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0          [ 76: 88] subch#4
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0          [ 89:100] subch#2
}*sqrt(2)*sqrt(2)

```

10 where (n_x, n_y) represents subcarriers of n_x^{th} to n_y^{th} subcarriers.

4. The method of claim 1, wherein if $m=256$, $p=4$, the number of the selected subchannels is 1, the selected one subchannel is a subchannel #2 which is a second subchannel among the 4 subchannels, then the given sequence
15 is P112subch(-100:100) given by

```

P112subch(-100:100)={

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0      [-100:-89] subch#1
-1 0 -1 0 -1 0 +1 0 -1 0 +1 0 +1 0      [- 88:-76] subch#2
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0          [- 75:-64] subch#3
20   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0      [- 63:-51] subch#4
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0          [- 50:-39] subch#1
-1 0 +1 0 -1 0 -1 0 +1 0 -1 0 -1 0      [- 38:-26] subch#2
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0          [- 25:-14] subch#3
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0          [- 13:- 1] subch#4
25   0                                     [DC]

```

```

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [ 1: 13] subch#1
+1 0 -1 0 -1 0 +1 0 +1 0 +1 0 +1 0 [ 14: 25] subch#2
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [ 26: 38] subch#3
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [ 39: 50] subch#4
5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [ 51: 63] subch#1
+1 0 -1 0 +1 0 +1 0 +1 0 -1 0 [ 64: 75] subch#2
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [ 76: 88] subch#3
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [ 89:100] subch#4
}
}*sqrt(2)*sqrt(2)

```

10 where $(n_x:n_y)$ represents subcarriers of n_x^{th} to n_y^{th} subcarriers.

5. The method of claim 1, wherein if $m=256$, $p=4$, the number of the selected subchannels is 1, the selected one subchannel is a subchannel #2 which is a second subchannel among the 4 subchannels, then the given sequence
15 is P212subch(-100:100) given by

```

P212subch(-100:100)={

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [-100:-89] subch#3
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [- 88:-76] subch#1
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [- 75:-64] subch#4
20 0 -1 0 +1 0 -1 0 +1 0 -1 0 +1 0 [- 63:-51] subch#2
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [- 50:-39] subch#1
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [- 38:-26] subch#3
0 -1 0 -1 0 +1 0 +1 0 +1 0 +1 0 [- 25:-14] subch#2
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [- 13:- 1] subch#4
25 0 [DC]
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [ 1: 13] subch#1

```

```

0 0 0 0 0 0 0 0 0 0 0 0 [ 14: 25] subch#3
-1 0 +1 0 -1 0 -1 0 +1 0 -1 0 -1 [ 26: 38] subch#2
0 0 0 0 0 0 0 0 0 0 0 0 [ 39: 50] subch#4
0 0 0 0 0 0 0 0 0 0 0 0 [ 51: 63] subch#3
5 0 0 0 0 0 0 0 0 0 0 0 0 [ 64: 75] subch#1
0 0 0 0 0 0 0 0 0 0 0 0 [ 76: 88] subch#4
0 +1 0 +1 0 -1 0 -1 0 +1 0 +1 [ 89:100] subch#2

```

$} * \sqrt{2} * \sqrt{2}$

where $(n_x:n_y)$ represents subcarriers of n_x^{th} to n_y^{th} subcarriers.

10

6. The method of claim 1, wherein if $m=256$, $p=4$, the number of the selected subchannels is 1, the selected one subchannel is a subchannel #3 which is a third subchannel among the 4 subchannels, then the given sequence is P113subch(-100:100) given by

```

15 P113subch(-100:100)={

0 0 0 0 0 0 0 0 0 0 0 0 [-100:-89] subch#1
0 0 0 0 0 0 0 0 0 0 0 0 [- 88:-76] subch#2
0 -1 0 -1 0 +1 0 -1 0 -1 0 -1 [- 75:-64] subch#3
0 0 0 0 0 0 0 0 0 0 0 0 [- 63:-51] subch#4
20 0 0 0 0 0 0 0 0 0 0 0 0 [- 50:-39] subch#1
0 0 0 0 0 0 0 0 0 0 0 0 [- 38:-26] subch#2
0 -1 0 +1 0 -1 0 -1 0 +1 0 +1 [- 25:-14] subch#3
0 0 0 0 0 0 0 0 0 0 0 0 [- 13:- 1] subch#4
0 [DC]

```

25 0 0 0 0 0 0 0 0 0 0 0 0 [1: 13] subch#1
0 0 0 0 0 0 0 0 0 0 0 0 [14: 25] subch#2

```

-1 0 +1 0 +1 0 +1 0 -1 0 -1 0 -1      [ 26: 38] subch#3
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0      [ 39: 50] subch#4
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0      [ 51: 63] subch#1
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0      [ 64: 75] subch#2
5   -1 0 +1 0 +1 0 +1 0 +1 0 -1 0 +1      [ 76: 88] subch#3
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0      [ 89:100] subch#4
) *sqrt(2) *sqrt(2)

```

where $(n_x:n_y)$ represents subcarriers of n_x^{th} to n_y^{th} subcarriers.

10 7. The method of claim 1, wherein if $m=256$, $p=4$, the number of
 the selected subchannels is 1, the selected one subchannel is a subchannel #3
 which is a third subchannel among the 4 subchannels, then the given sequence is
 P213subch(-100:100) given by

```

P213subch(-100:100)={

15     -1 0 -1 0 +1 0 +1 0 -1 0 -1 0      [-100:-89] subch#3
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0      [- 88:-76] subch#1
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0      [- 75:-64] subch#4
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0      [- 63:-51] subch#2
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0      [- 50:-39] subch#1
20     +1 0 +1 0 -1 0 +1 0 +1 0 -1 0 +1      [- 38:-26] subch#3
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0      [- 25:-14] subch#2
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0      [- 13:- 1] subch#4
0                                     [DC]
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0      [  1: 13] subch#1
25     -1 0 -1 0 -1 0 -1 0 +1 0 +1 0      [ 14: 25] subch#3
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0      [ 26: 38] subch#2

```

0 0 0 0 0 0 0 0 0 0 0 0	[39: 50] subch#4
0 -1 0 +1 0 -1 0 +1 0 -1 0 +1 0	[51: 63] subch#3
0 0 0 0 0 0 0 0 0 0 0 0	[64: 75] subch#1
0 0 0 0 0 0 0 0 0 0 0 0	[76: 88] subch#4
5 0 0 0 0 0 0 0 0 0 0 0	[89:100] subch#2

where $(n_x; n_y)$ represents subcarriers of n_x^{th} to n_y^{th} subcarriers.

8. The method of claim 1, wherein if m=256, p=4, the number of
10 the selected subchannels is 1, the selected one subchannel is a subchannel #4
which is a fourth subchannel among the 4 subchannels, then the given sequence
is P114subch(-100:100) given by

```

P114subch(-100:100)={

0 0 0 0 0 0 0 0 0 0 0 0 [-100:-89] subch#1

15      0 0 0 0 0 0 0 0 0 0 0 0 [- 88:-76] subch#2

          0 0 0 0 0 0 0 0 0 0 0 0 [- 75:-64] subch#3

          0 -1 0 +1 0 +1 0 -1 0 -1 0 -1 0 [- 63:-51] subch#4

          0 0 0 0 0 0 0 0 0 0 0 0 [- 50:-39] subch#1

          0 0 0 0 0 0 0 0 0 0 0 0 [- 38:-26] subch#2

20      0 0 0 0 0 0 0 0 0 0 0 0 [- 25:-14] subch#3

          0 +1 0 +1 0 +1 0 -1 0 +1 0 -1 0 [- 13:- 1] subch#4

          0 [DC]

          0 0 0 0 0 0 0 0 0 0 0 0 [  1: 13] subch#1

          0 0 0 0 0 0 0 0 0 0 0 0 [ 14: 25] subch#2

25      0 0 0 0 0 0 0 0 0 0 0 0 [ 26: 38] subch#3

          0 +1 0 -1 0 +1 0 +1 0 -1 0 -1 [ 39: 50] subch#4

```

```

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [ 51: 63] subch#1
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [ 64: 75] subch#2
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [ 76: 88] subch#3
0 -1 0 -1 0 -1 0 -1 0 +1 0 -1 [ 89:100] subch#4

```

5 }*sqrt(2)*sqrt(2)

where $(n_x:n_y)$ represents subcarriers of n_x^{th} to n_y^{th} subcarriers.

9. The method of claim 1, wherein if $m=256$, $p=4$, the number of
the selected subchannels is 1, the selected one subchannel is a subchannel #4
10 which is a fourth subchannel among the 4 subchannels, then the given sequence
is P214subch(-100:100) given by

```

P214subch (-100:100)={

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [-100:-89] subch#3
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [- 88:-76] subch#1
15 0 -1 0 -1 0 -1 0 -1 0 +1 0 +1 [- 75:-64] subch#4
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [- 63:-51] subch#2
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [- 50:-39] subch#1
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [- 38:-26] subch#3
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [- 25:-14] subch#2
20 0 +1 0 -1 0 +1 0 -1 0 +1 0 -1 0 [- 13:- 1] subch#4
0 [DC]
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [ 1: 13] subch#1
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [ 14: 25] subch#3
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [ 26: 38] subch#2
25 0 +1 0 +1 0 -1 0 +1 0 +1 0 -1 [ 39: 50] subch#4
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [ 51: 63] subch#3

```

```

0 0 0 0 0 0 0 0 0 0 0 0 [ 64: 75] subch#1
+1 0 +1 0 +1 0 +1 0 -1 0 -1 0 +1 [ 76: 88] subch#4
0 0 0 0 0 0 0 0 0 0 0 0 [ 89:100] subch#2
} *sqrt(2) *sqrt(2)

```

5 where $(n_x:n_y)$ represents subcarriers of n_x^{th} to n_y^{th} subcarriers.

10. The method of claim 1, wherein if $m=256$, $p=4$, the number of
 the selected subchannels is 2, the selected two subchannel are a subchannel #1
 which is a first subchannel and a subchannel #3 which is a third subchannel
 10 among the 4 subchannels, then the given sequence is P12(1+3)subch(-100:100)
 given by

```

P12(1+3)subch(-100:100)={

    -1 0 +1 0 +1 0 -1 0 +1 0 -1 0 [-100:-89] subch#1+subch#3
    0 0 0 0 0 0 0 0 0 0 0 0 [- 88:-76] subch#2+subch#4
15      0 -1 0 +1 0 +1 0 +1 0 +1 0 +1 [- 75:-64] subch#1+subch#3
    0 0 0 0 0 0 0 0 0 0 0 0 [- 63:-51] subch#2+subch#4
    +1 0 +1 0 +1 0 -1 0 -1 0 -1 0 [- 50:-39] subch#1+subch#3
    0 0 0 0 0 0 0 0 0 0 0 0 [- 38:-26] subch#2+subch#4
    0 -1 0 +1 0 -1 0 -1 0 -1 0 -1 [- 25:-14] subch#1+subch#3
20      0 0 0 0 0 0 0 0 0 0 0 0 [- 13:- 1] subch#2+subch#4
    0 [DC]
    0 +1 0 +1 0 +1 0 -1 0 +1 0 +1 0 [ 1: 13] subch#1+subch#3
    0 0 0 0 0 0 0 0 0 0 0 0 [- 14: 25] subch#2+subch#4
    -1 0 +1 0 +1 0 -1 0 +1 0 +1 0 -1 [ 26: 38] subch#1+subch#3
25      0 0 0 0 0 0 0 0 0 0 0 0 [- 39: 50] subch#2+subch#4
    0 +1 0 +1 0 -1 0 +1 0 -1 0 +1 0 [ 51: 63] subch#1+subch#3

```

```

0 0 0 0 0 0 0 0 0 0 0 0 [ 64: 75] subch#2+subch#4
-1 0 -1 0 -1 0 +1 0 -1 0 -1 0 -1 [ 76: 88] subch#1+subch#3
0 0 0 0 0 0 0 0 0 0 0 0 [ 89:100] subch#2+subch#4
} *sqrt(2) *sqrt(2)

```

5 where $(n_x:n_y)$ represents subcarriers of n_x^{th} to n_y^{th} subcarriers.

11. The method of claim 1, wherein if $m=256$, $p=4$, the number of the selected subchannels is 2, the selected two subchannel are a subchannel #1 which is a first subchannel and a subchannel #2 which is a second subchannel 10 among the 4 subchannels, then the given sequence is P22(1+2)subch(-100:100) given by

```

P22(1+2)subch(-100:100)={

0 0 0 0 0 0 0 0 0 0 0 0 [-100:-89] subch#3+subch#4
+1 0 +1 0 +1 0 +1 0 -1 0 -1 0 -1 [- 88:-76] subch#1+subch#2
15 0 0 0 0 0 0 0 0 0 0 0 0 [- 75:-64] subch#3+subch#4
0 +1 0 -1 0 +1 0 +1 0 +1 0 +1 0 [- 63:-51] subch#1+subch#2
0 0 0 0 0 0 0 0 0 0 0 0 [- 50:-39] subch#3+subch#4
-1 0 +1 0 -1 0 +1 0 +1 0 +1 0 +1 [- 38:-26] subch#1+subch#2
0 0 0 0 0 0 0 0 0 0 0 0 [- 25:-14] subch#3+subch#4
20 0 -1 0 +1 0 +1 0 -1 0 -1 0 -1 0 [- 13:- 1] subch#1+subch#2
0 [DC]
0 +1 0 -1 0 -1 0 +1 0 +1 0 +1 0 [ 1: 13] subch#1+subch#2
0 0 0 0 0 0 0 0 0 0 0 0 [- 14: 25] subch#3+subch#4
-1 0 +1 0 +1 0 -1 0 -1 0 +1 0 -1 [ 26: 38] subch#1+subch#2
25 0 0 0 0 0 0 0 0 0 0 0 0 [ 39: 50] subch#3+subch#4
0 +1 0 -1 0 +1 0 +1 0 +1 0 +1 0 [ 51: 63] subch#1+subch#2

```

```

0 0 0 0 0 0 0 0 0 0 0 0 [ 64: 75] subch#3+subch#4
-1 0 -1 0 -1 0 +1 0 +1 0 -1 0 +1 [ 76: 88] subch#1+subch#2
0 0 0 0 0 0 0 0 0 0 0 0 [ 89:100] subch#3+subch#4
} *sqrt(2) *sqrt(2)

```

5 where $(n_x:n_y)$ represents subcarriers of n_x^{th} to n_y^{th} subcarriers.

12. The method of claim 1, wherein if $m=256$, $p=4$, the number of the selected subchannels is 2, the selected two subchannel are a subchannel #2 which is a second subchannel and a subchannel #4 which is a fourth subchannel among the 4 subchannels, then the given sequence is P12(2+4)subch(-100:100) given by

```

P12(2+4)subch(-100:100)={

0 0 0 0 0 0 0 0 0 0 0 0 [-100:-89] subch#1+subch#3
-1 0 -1 0 +1 0 -1 0 +1 0 -1 0 +1 [- 88:-76] subch#2+subch#4
15 0 0 0 0 0 0 0 0 0 0 0 0 [- 75:-64] subch#1+subch#3
0 -1 0 +1 0 -1 0 +1 0 +1 0 -1 0 [- 63:-51] subch#2+subch#4
0 0 0 0 0 0 0 0 0 0 0 0 [- 50:-39] subch#1+subch#3
-1 0 -1 0 +1 0 +1 0 -1 0 +1 0 -1 [- 38:-26] subch#2+subch#4
0 0 0 0 0 0 0 0 0 0 0 0 [- 25:-14] subch#1+subch#3
20 0 -1 0 +1 0 -1 0 +1 0 +1 0 -1 0 [- 13:- 1] subch#2+subch#4
0 [DC]
0 0 0 0 0 0 0 0 0 0 0 0 [ 1: 13] subch#1+subch#3
+1 0 +1 0 +1 0 -1 0 +1 0 +1 0 [ 14: 25] subch#2+subch#4
0 0 0 0 0 0 0 0 0 0 0 0 [ 26: 38] subch#1+subch#3
25 0 +1 0 +1 0 -1 0 -1 0 +1 0 +1 [ 39: 50] subch#2+subch#4
0 0 0 0 0 0 0 0 0 0 0 0 [ 51: 63] subch#1+subch#3

```

```

-1 0 -1 0 -1 0 -1 0 +1 0 -1 0          [ 64: 75] subch#2+subch#4
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0           [ 76: 88] subch#1+subch#3
0 +1 0 +1 0 +1 0 -1 0 -1 0 -1 0 -1    [ 89:100] subch#2+subch#4
} *sqrt(2) *sqrt(2)

```

5 where $(n_x:n_y)$ represents subcarriers of n_x^{th} to n_y^{th} subcarriers.

13. The method of claim 1, wherein if $m=256$, $p=4$, the number of the selected subchannels is 2, the selected two subchannel are a subchannel #3 which is a third subchannel and a subchannel #4 which is a fourth subchannel 10 among the 4 subchannels, then the given sequence is P22(3+4)subch(-100:100) given by

```

P22(3+4)subch(-100:100)={

+1 0 -1 0 +1 0 +1 0 -1 0 +1 0          [-100:-89] subch#3+subch#4
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0           [- 88:-76] subch#1+subch#2
15      0 +1 0 +1 0 +1 0 -1 0 +1 0 +1    [- 75:-64] subch#3+subch#4
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0           [- 63:-51] subch#1+subch#2
+1 0 -1 0 +1 0 +1 0 -1 0 +1 0          [- 50:-39] subch#3+subch#4
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0           [- 38:-26] subch#1+subch#2
0 -1 0 +1 0 -1 0 +1 0 -1 0 +1          [- 25:-14] subch#3+subch#4
20      0 0 0 0 0 0 0 0 0 0 0 0 0 0 0           [- 13:- 1] subch#1+subch#2
0                                     [DC]
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0           [  1: 13] subch#1+subch#2
-1 0 +1 0 -1 0 -1 0 -1 0 +1 0          [ 14: 25] subch#3+subch#4
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0           [ 26: 38] subch#1+subch#2
25      0 +1 0 +1 0 +1 0 -1 0 -1 0 -1    [ 39: 50] subch#3+subch#4
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0           [ 51: 63] subch#1+subch#2

```

```

-1 0 +1 0 -1 0 -1 0 -1 0 +1 0      [ 64: 75] subch#3+subch#4
0 0 0 0 0 0 0 0 0 0 0      [ 76: 88] subch#1+subch#2
0 +1 0 -1 0 -1 0 +1 0 +1 0 +1      [ 89:100] subch#3+subch#4
} *sqrt(2) *sqrt(2)

```

5 where $(n_x:n_y)$ represents subcarriers of n_x^{th} to n_y^{th} subcarriers.

14. The method of claim 1, wherein all of the subcarriers except the n subcarriers assigned to the subchannels are subcarriers corresponding to an interference-removed component between a DC component and the subcarriers.

10

15. An apparatus for generating a preamble sequence in an orthogonal frequency division multiplexing (OFDM) communication system having m subcarriers in a frequency domain, comprising:

15 a preamble sequence generator for generating the preamble sequence so that data of a given preamble sequence is assigned to at least one subchannel selected from p subchannels generated by grouping the m subcarriers by n subcarriers, where n is less than m, and null data is assigned to subchannels not selected from the p subchannels; and

20 an inverse fast Fourier transformer (IFFT) for receiving the preamble sequence, assigning null data to subcarriers except the n subcarriers assigned to the subchannels, and thereafter performing inverse fast Fourier transform for transforming the data into time-domain data.

16. The apparatus of claim 15, wherein if m=256, p=4, the number 25 of the selected subchannels is 1, the selected one subchannel is a subchannel #1 which is a first subchannel among the 4 subchannels, then the given sequence is P111subch(-100:100) given by

P111subch(-100:100)={

```

-1 0 +1 0 +1 0 -1 0 -1 0 -1 0      [-100:-89] subch#1

```

```

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [- 88:-76] subch#2
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [- 75:-64] subch#3
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [- 63:-51] subch#4
+1 0 +1 0 +1 0 -1 0 +1 0 -1 0 [- 50:-39] subch#1
5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [- 38:-26] subch#2
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [- 25:-14] subch#3
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [- 13:- 1] subch#4
0 [DC]
0 +1 0 -1 0 +1 0 +1 0 -1 0 -1 0 [ 1: 13] subch#1
10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [ 14: 25] subch#2
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [ 26: 38] subch#3
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [ 39: 50] subch#4
0 -1 0 -1 0 -1 0 -1 0 +1 0 -1 0 [ 51: 63] subch#1
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [ 64: 75] subch#2
15 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [ 76: 88] subch#3
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [ 89:100] subch#4

```

$\} * \text{sqrt}(2) * \text{sqrt}(2)$

where $(n_x:n_y)$ represents subcarriers of n_x^{th} to n_y^{th} subcarriers.

20 17. The apparatus of claim 15, wherein if $m=256$, $p=4$, the number of the selected subchannels is 1, the selected one subchannel is a subchannel #1 which is a first subchannel among the 4 subchannels, then the given sequence is P211subch(-100:100) given by

```

p211subch(-100:100)={

25            0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [-100:-89] subch#3

```

```

-1 0 +1 0 +1 0 -1 0 -1 0 -1 0 -1      [- 88:-76] subch#1
0 0 0 0 0 0 0 0 0 0 0 0                  [- 75:-64] subch#4
0 0 0 0 0 0 0 0 0 0 0 0                  [- 63:-51] subch#2
+1 0 -1 0 -1 0 +1 0 -1 0 -1 0          [- 50:-39] subch#1
5   0 0 0 0 0 0 0 0 0 0 0 0                  [- 38:-26] subch#3
0 0 0 0 0 0 0 0 0 0 0 0                  [- 25:-14] subch#2
0 0 0 0 0 0 0 0 0 0 0 0                  [- 13:- 1] subch#4
0                                         [DC]
0 +1 0 -1 0 +1 0 -1 0 +1 0 -1 0          [  1: 13] subch#1
10  0 0 0 0 0 0 0 0 0 0 0 0                  [ 14: 25] subch#3
0 0 0 0 0 0 0 0 0 0 0 0                  [ 26: 38] subch#2
0 0 0 0 0 0 0 0 0 0 0 0                  [ 39: 50] subch#4
0 0 0 0 0 0 0 0 0 0 0 0                  [ 51: 63] subch#3
-1 0 -1 0 +1 0 +1 0 +1 0 +1 0          [ 64: 75] subch#1
15  0 0 0 0 0 0 0 0 0 0 0 0                  [ 76: 88] subch#4
0 0 0 0 0 0 0 0 0 0 0 0                  [ 89:100] subch#2
}*sqrt(2)*sqrt(2)

```

where $(n_x; n_y)$ represents subcarriers of n_x^{th} to n_y^{th} subcarriers.

20 18. The apparatus of claim 15, wherein if $m=256$, $p=4$, the number of the selected subchannels is 1, the selected one subchannel is a subchannel #2 which is a second subchannel among the 4 subchannels, then the given sequence is P112subch(-100:100) given by

```

P112subch(-100:100)={

25   0 0 0 0 0 0 0 0 0 0 0 0                  [-100:-89] subch#1

```

```

-1 0 -1 0 -1 0 +1 0 -1 0 +1 0 +1      [- 88:-76] subch#2
0 0 0 0 0 0 0 0 0 0 0 0                  [- 75:-64] subch#3
0 0 0 0 0 0 0 0 0 0 0 0                  [- 63:-51] subch#4
0 0 0 0 0 0 0 0 0 0 0 0                  [- 50:-39] subch#1
5   -1 0 +1 0 -1 0 -1 0 +1 0 -1 0 -1      [- 38:-26] subch#2
0 0 0 0 0 0 0 0 0 0 0 0                  [- 25:-14] subch#3
0 0 0 0 0 0 0 0 0 0 0 0                  [- 13:- 1] subch#4
0                                         [DC]
0 0 0 0 0 0 0 0 0 0 0 0                  [ 1: 13] subch#1
10  +1 0 -1 0 -1 0 +1 0 +1 0 +1 0      [ 14: 25] subch#2
0 0 0 0 0 0 0 0 0 0 0 0                  [ 26: 38] subch#3
0 0 0 0 0 0 0 0 0 0 0 0                  [ 39: 50] subch#4
0 0 0 0 0 0 0 0 0 0 0 0                  [ 51: 63] subch#1
+1 0 -1 0 +1 0 +1 0 +1 0 -1 0          [ 64: 75] subch#2
15  0 0 0 0 0 0 0 0 0 0 0 0                  [ 76: 88] subch#3
0 0 0 0 0 0 0 0 0 0 0 0                  [ 89:100] subch#4

```

$\} * \text{sqrt}(2) * \text{sqrt}(2)$

where $(n_x:n_y)$ represents subcarriers of n_x^{th} to n_y^{th} subcarriers.

20 19. The apparatus of claim 15, wherein if $m=256$, $p=4$, the number of the selected subchannels is 1, the selected one subchannel is a subchannel #2 which is a second subchannel among the 4 subchannels, then the given sequence is P212subch(-100:100) given by

```

P212subch(-100:100)={

25   0 0 0 0 0 0 0 0 0 0 0 0                  [-100:-89] subch#3
0 0 0 0 0 0 0 0 0 0 0 0                  [- 88:-76] subch#1

```

```

          0 0 0 0 0 0 0 0 0 0 0 0 [- 75:-64] subch#4
          0 -1 0 +1 0 -1 0 +1 0 -1 0 +1 0 [- 63:-51] subch#2
          0 0 0 0 0 0 0 0 0 0 0 0 [- 50:-39] subch#1
          0 0 0 0 0 0 0 0 0 0 0 0 [- 38:-26] subch#3
      5   0 -1 0 -1 0 +1 0 +1 0 +1 0 +1 [- 25:-14] subch#2
          0 0 0 0 0 0 0 0 0 0 0 0 [- 13:- 1] subch#4
          0 [DC]
          0 0 0 0 0 0 0 0 0 0 0 0 [  1: 13] subch#1
          0 0 0 0 0 0 0 0 0 0 0 0 [ 14: 25] subch#3
      10  -1 0 +1 0 -1 0 -1 0 +1 0 -1 0 -1 [ 26: 38] subch#2
          0 0 0 0 0 0 0 0 0 0 0 0 [ 39: 50] subch#4
          0 0 0 0 0 0 0 0 0 0 0 0 [ 51: 63] subch#3
          0 0 0 0 0 0 0 0 0 0 0 0 [ 64: 75] subch#1
          0 0 0 0 0 0 0 0 0 0 0 0 [ 76: 88] subch#4
      15  0 +1 0 +1 0 -1 0 -1 0 +1 0 +1 [ 89:100] subch#2
          }*sqrt(2)*sqrt(2)
where (nx:ny) represents subcarriers of nxth to nyth subcarriers.

```

20. The apparatus of claim 15, wherein if m=256, p=4, the number
 20 of the selected subchannels is 1, the selected one subchannel is a subchannel #3
 which is a third subchannel among the 4 subchannels, then the given sequence is
 P113subch(-100:100) given by

```

P113subch(-100:100)={

          0 0 0 0 0 0 0 0 0 0 0 0 [-100:-89] subch#1
      25    0 0 0 0 0 0 0 0 0 0 0 0 [- 88:-76] subch#2
          0 -1 0 -1 0 +1 0 -1 0 -1 0 -1 [- 75:-64] subch#3

```

where $(n_x:n_y)$ represents subcarriers of n_x^{th} to n_y^{th} subcarriers.

21. The apparatus of claim 15, wherein if $m=256$, $p=4$, the number
of the selected subchannels is 1, the selected one subchannel is a subchannel #3
20 which is a third subchannel among the 4 subchannels, then the given sequence is
P213subch(-100:100) given by

```

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [- 50:-39] subch#1
+1 0 +1 0 -1 0 +1 0 +1 0 -1 0 +1 [- 38:-26] subch#3
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [- 25:-14] subch#2
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [- 13:- 1] subch#4
5 0 [DC]
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [ 1: 13] subch#1
-1 0 -1 0 -1 0 -1 0 +1 0 +1 0 [ 14: 25] subch#3
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [ 26: 38] subch#2
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [ 39: 50] subch#4
10 0 -1 0 +1 0 -1 0 +1 0 -1 0 -1 0 +1 0 [ 51: 63] subch#3
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [ 64: 75] subch#1
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [ 76: 88] subch#4
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [ 89:100] subch#2
)*sqrt(2)*sqrt(2)

```

15 where $(n_x:n_y)$ represents subcarriers of n_x^{th} to n_y^{th} subcarriers.

22. The apparatus of claim 15, wherein if $m=256$, $p=4$, the number of the selected subchannels is 1, the selected one subchannel is a subchannel #4 which is a fourth subchannel among the 4 subchannels, then the given sequence
20 is P114subch(-100:100) given by

```

P114subch(-100:100)={

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [-100:-89] subch#1
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [- 88:-76] subch#2
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [- 75:-64] subch#3
25 0 -1 0 +1 0 +1 0 -1 0 -1 0 -1 0 [- 63:-51] subch#4
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [- 50:-39] subch#1

```

```

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [- 38:-26] subch#2
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [- 25:-14] subch#3
0 +1 0 +1 0 +1 0 -1 0 +1 0 -1 0 [- 13:- 1] subch#4
0 [DC]
5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [  1: 13] subch#1
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [- 14: 25] subch#2
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [ 26: 38] subch#3
0 +1 0 -1 0 +1 0 +1 0 -1 0 -1 [- 39: 50] subch#4
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [ 51: 63] subch#1
10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [- 64: 75] subch#2
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [- 76: 88] subch#3
0 -1 0 -1 0 -1 0 -1 0 +1 0 -1 [ 89:100] subch#4

```

$\} * \text{sqrt}(2) * \text{sqrt}(2)$

where $(n_x:n_y)$ represents subcarriers of n_x^{th} to n_y^{th} subcarriers.

15

23. The apparatus of claim 15, wherein if $m=256$, $p=4$, the number of the selected subchannels is 1, the selected one subchannel is a subchannel #4 which is a fourth subchannel among the 4 subchannels, then the given sequence is P214subch(-100:100) given by

```

20 P214subch(-100:100)={

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [-100:-89] subch#3
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [- 88:-76] subch#1
0 -1 0 -1 0 -1 0 -1 0 +1 0 +1 [- 75:-64] subch#4
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [- 63:-51] subch#2
25 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [- 50:-39] subch#1
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [- 38:-26] subch#3

```

	0 0 0 0 0 0 0 0 0 0 0 0 0 0	[- 25:-14] subch#2
	0 +1 0 -1 0 +1 0 -1 0 +1 0 -1 0	[- 13:- 1] subch#4
	0	[DC]
	0 0 0 0 0 0 0 0 0 0 0 0 0 0	[1: 13] subch#1
5	0 0 0 0 0 0 0 0 0 0 0 0 0 0	[14: 25] subch#3
	0 0 0 0 0 0 0 0 0 0 0 0 0 0	[26: 38] subch#2
	0 +1 0 +1 0 -1 0 +1 0 +1 0 -1	[39: 50] subch#4
	0 0 0 0 0 0 0 0 0 0 0 0 0 0	[51: 63] subch#3
	0 0 0 0 0 0 0 0 0 0 0 0 0 0	[64: 75]..subch#1
10	+1 0 +1 0 +1 0 +1 0 -1 0 -1 0 +1	[76: 88] subch#4
	0 0 0 0 0 0 0 0 0 0 0 0 0 0	[89:100] subch#2

where $(n_x \dots n_y)$ represents subcarriers of n_x^{th} to n_y^{th} subcarriers.

15 24. The apparatus of claim 15, wherein if m=256, p=4, the number
of the selected subchannels is 2, the selected two subchannel are a subchannel #1
which is a first subchannel and a subchannel #3 which is a third subchannel
among the 4 subchannels, then the given sequence is P12(1+3)subch(-100:100)
given by

```

20 P12(1+3)subch(-100:100)={

    -1 0 +1 0 +1 0 -1 0 +1 0 -1 0 [-100:-89] subch#1+subch#3

    0 0 0 0 0 0 0 0 0 0 0 0 [-88:-76] subch#2+subch#4

    0 -1 0 +1 0 +1 0 +1 0 +1 0 +1 [-75:-64] subch#1+subch#3

    0 0 0 0 0 0 0 0 0 0 0 0 [-63:-51] subch#2+subch#4

25      +1 0 +1 0 +1 0 -1 0 -1 0 -1 0 [-50:-39] subch#1+subch#3

    0 0 0 0 0 0 0 0 0 0 0 0 [-38:-26] subch#2+subch#4

```

```

0 -1 0 +1 0 -1 0 -1 0 -1 0 -1          [- 25:-14] subch#1+subch#3
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0           [- 13:- 1] subch#2+subch#4
0                                         [DC]
0 +1 0 +1 0 +1 0 -1 0 +1 0 +1 0         [  1: 13] subch#1+subch#3
5   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0           [- 14: 25] subch#2+subch#4
-1 0 +1 0 +1 0 -1 0 +1 0 +1 0 -1        [- 26: 38] subch#1+subch#3
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0           [- 39: 50] subch#2+subch#4
0 +1 0 +1 0 -1 0 +1 0 -1 0 +1 0         [- 51: 63] subch#1+subch#3
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0           [- 64: 75] subch#2+subch#4
10  -1 0 -1 0 -1 0 +1 0 -1 0 -1 0 -1      [- 76: 88] subch#1+subch#3
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0           [- 89:100] subch#2+subch#4

```

$\} * \sqrt{2} * \sqrt{2}$

where $(n_x:n_y)$ represents subcarriers of n_x^{th} to n_y^{th} subcarriers.

15 25. The apparatus of claim 15, wherein if $m=256$, $p=4$, the number of the selected subchannels is 2, the selected two subchannel are a subchannel #1 which is a first subchannel and a subchannel #2 which is a second subchannel among the 4 subchannels, then the given sequence is P22(1+2)subch(-100:100) given by

```

20 P22(1+2)subch(-100:100)={

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0           [-100:-89] subch#3+subch#4
+1 0 +1 0 +1 0 +1 0 -1 0 -1 0 -1       [- 88:-76] subch#1+subch#2
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0           [- 75:-64] subch#3+subch#4
0 +1 0 -1 0 +1 0 +1 0 +1 0 +1 0         [- 63:-51] subch#1+subch#2
25   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0           [- 50:-39] subch#3+subch#4
-1 0 +1 0 -1 0 +1 0 +1 0 +1 0 +1 0       [- 38:-26] subch#1+subch#2

```

```

0 0 0 0 0 0 0 0 0 0 0 0 [- 25:-14] subch#3+subch#4
0 -1 0 +1 0 +1 0 -1 0 -1 0 -1 0 [- 13:- 1] subch#1+subch#2
0 [DC]
0 +1 0 -1 0 -1 0 +1 0 +1 0 +1 0 [ 1: 13] subch#1+subch#2
5 0 0 0 0 0 0 0 0 0 0 0 0 [ 14: 25] subch#3+subch#4
-1 0 +1 0 +1 0 -1 0 -1 0 +1 0 -1 [- 26: 38] subch#1+subch#2
0 0 0 0 0 0 0 0 0 0 0 0 [ 39: 50] subch#3+subch#4
0 +1 0 -1 0 +1 0 +1 0 +1 0 +1 0 [ 51: 63] subch#1+subch#2
0 0 0 0 0 0 0 0 0 0 0 0 [ 64: 75] subch#3+subch#4
10 -1 0 -1 0 -1 0 +1 0 +1 0 -1 0 +1 [- 76: 88] subch#1+subch#2
0 0 0 0 0 0 0 0 0 0 0 0 [ 89:100] subch#3+subch#4

```

$\} * \text{sqrt}(2) * \text{sqrt}(2)$

where $(n_x:n_y)$ represents subcarriers of n_x^{th} to n_y^{th} subcarriers.

15 26. The apparatus of claim 15, wherein if $m=256$, $p=4$, the number of the selected subchannels is 2, the selected two subchannel are a subchannel #2 which is a second subchannel and a subchannel #4 which is a fourth subchannel among the 4 subchannels, then the given sequence is P12(2+4)subch(-100:100) given by

```

20 P12(2+4)subch(-100:100)={

0 0 0 0 0 0 0 0 0 0 0 0 [-100:-89] subch#1+subch#3
-1 0 -1 0 +1 0 -1 0 +1 0 -1 0 +1 [- 88:-76] subch#2+subch#4
0 0 0 0 0 0 0 0 0 0 0 0 [- 75:-64] subch#1+subch#3
0 -1 0 +1 0 -1 0 +1 0 +1 0 -1 0 [- 63:-51] subch#2+subch#4
25 0 0 0 0 0 0 0 0 0 0 0 0 [- 50:-39] subch#1+subch#3
-1 0 -1 0 +1 0 +1 0 -1 0 +1 0 -1 [- 38:-26] subch#2+subch#4

```

```

0 0 0 0 0 0 0 0 0 0 0 0 [- 25:-14] subch#1+subch#3
0 -1 0 +1 0 -1 0 +1 0 +1 0 -1 0 [- 13:- 1] subch#2+subch#4
0 [DC]
0 0 0 0 0 0 0 0 0 0 0 0 [ 1: 13] subch#1+subch#3
5 +1 0 +1 0 +1 0 -1 0 +1 0 +1 0 [ 14: 25] subch#2+subch#4
0 0 0 0 0 0 0 0 0 0 0 0 [ 26: 38] subch#1+subch#3
0 +1 0 +1 0 -1 0 -1 0 +1 0 +1 [ 39: 50] subch#2+subch#4
0 0 0 0 0 0 0 0 0 0 0 0 [ 51: 63] subch#1+subch#3
-1 0 -1 0 -1 0 -1 0 +1 0 -1 0 [ 64: 75] subch#2+subch#4
10 0 0 0 0 0 0 0 0 0 0 0 0 [ 76: 88] subch#1+subch#3
0 +1 0 +1 0 +1 0 -1 0 -1 0 -1 [ 89:100] subch#2+subch#4
} *sqrt(2) *sqrt(2)

```

where $(n_x:n_y)$ represents subcarriers of n_x^{th} to n_y^{th} subcarriers.

15 27. The apparatus of claim 15, wherein if $m=256$, $p=4$, the number of the selected subchannels is 2, the selected two subchannel are a subchannel #3 which is a third subchannel and a subchannel #4 which is a fourth subchannel among the 4 subchannels, then the given sequence is P22(3+4)subch(-100:100) given by

```

20 P22(3+4)subch(-100:100)={

+1 0 -1 0 +1 0 +1 0 -1 0 +1 0 [-100:-89] subch#3+subch#4
0 0 0 0 0 0 0 0 0 0 0 0 [- 88:-76] subch#1+subch#2
0 +1 0 +1 0 +1 0 -1 0 +1 0 +1 [- 75:-64] subch#3+subch#4
0 0 0 0 0 0 0 0 0 0 0 0 [- 63:-51] subch#1+subch#2
25 +1 0 -1 0 +1 0 +1 0 -1 0 +1 0 [- 50:-39] subch#3+subch#4
0 0 0 0 0 0 0 0 0 0 0 0 [- 38:-26] subch#1+subch#2

```

```

0 -1 0 +1 0 -1 0 +1 0 -1 0 +1 [- 25:-14] subch#3+subch#4
0 0 0 0 0 0 0 0 0 0 0 0 [- 13:- 1] subch#1+subch#2
0 [DC]
0 0 0 0 0 0 0 0 0 0 0 0 [ 1: 13] subch#1+subch#2
5 -1 0 +1 0 -1 0 -1 0 -1 0 +1 0 [- 14: 25] subch#3+subch#4
0 0 0 0 0 0 0 0 0 0 0 0 [ 26: 38] .subch#1+subch#2
0 +1 0 +1 0 +1 0 -1 0 -1 0 -1 [ 39: 50] subch#3+subch#4
0 0 0 0 0 0 0 0 0 0 0 0 [ 51: 63] subch#1+subch#2
-1 0 +1 0 -1 0 -1 0 -1 0 +1 0 [- 64: 75] subch#3+subch#4
10 0 0 0 0 0 0 0 0 0 0 0 0 [ 76: 88] subch#1+subch#2
0 +1 0 -1 0 -1 0 +1 0 +1 0 +1 [ 89:100] subch#3+subch#4

```

$\} * \sqrt{2} * \sqrt{2}$

where $(n_x:n_y)$ represents subcarriers of n_x^{th} to n_y^{th} subcarriers.

15 28. The apparatus of claim 15, wherein all of the subcarriers except
 the n subcarriers assigned to the subchannels are subcarriers corresponding to an
 interference-removed component between a DC component and the subcarriers.